

Zero Retries issue 0025 2021-12-24

Advanced Amateur Radio - Data Communications; Space; Microwave... the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios. - Bob Witte K0NR; Amateur Radio is literally having a license to experiment with radio technology. - Steve Stroh N8GNJ; Ultimately, amateur radio must prove that it is useful for society. - Dr. Karl Meinzer DJ4ZC; We are confronted by insurmountable opportunities! - Pogo; Nothing great has ever been accomplished without irrational exuberance - Tom Evslin; Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ.

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor

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Request to Send

Countdown to [Hamvention](#) 2022 - May 20-22, in Xenia, Ohio - 21 weeks...

Merry Christmas Zero Retries subscribers!

I'm queuing this up prior to Christmas week so I can "set and forget" for Christmas week, so apologies for the lack of "this week" stories.

I am grateful for many, many things, and I am blessed in my life. I hope the same is true for all

you Zero Retries readers. Beyond that, the Jack O'Neil quote I cited in Zero Retries 0000 seems apropos:

Well, I suppose now is the time for me to say something profound.

[long pause]

Nothing comes to mind. Let's do it.

Zero Retries 0026 on 2021-12-31, as currently planned, will be a look back on 2021.

Personal note:

As of 2021-12-10, I am no longer a member of Amateur Radio Digital Communications (ARDC) Grants Advisory Committee (GAC). This was a mutual decision between ARDC and I. I'm grateful to ARDC for the chance to help effect so much positive change in Amateur Radio via ARDC grants in 2021. I remain a strong supporter of ARDC and its missions, and it's possible that I will continue to volunteer with ARDC in another role, but that is yet to be determined.

World's Smallest Moon Lander from Japan will Put Ham Radio Transmitter on the Moon

([Link - ARRL](#)) 12/09/2021

Japan's [OMOTENASHI](#), the world's smallest moon lander, will have an X-band and UHF communication system, although it will not carry an amateur band transponder. OMOTENASHI is a 6U CubeSat set for launch via a NASA SLS rocket as early as February 2022. It will have a mission period of from 4 to 5 days. The name is an acronym for Outstanding Moon Exploration Technologies demonstrated by Nano Semi-Hard Impactor. Wataru Torii of the Japan Aerospace Exploration Agency (JAXA) Ham Radio Club, JQ1ZVI, said radio amateurs can play a role in gathering data from the spacecraft.

The spacecraft is made up of two separable components, both having independent communication systems — an orbiting module and a surface probe. The orbiting module will take the surface probe to the moon. It will transmit beacon or digital telemetry data on UHF (437.31 MHz). The surface probe — the moon lander — will transmit digital telemetry or three-axis acceleration analog-wave with FM modulation on UHF (437.41 MHz). Transmitter power will be 1 W in both cases. “If we succeed in receiving the UHF signal from the surface probe, we could know the acceleration data on the impact on the moon and the success of the landing sequence,” Torii explained.

“We already have a station for uplink and downlink at Wakayama in Japan — used as an EME [moonbounce] station. However, if the satellite is invisible from Japan, we cannot receive the downlink signal. So, we need a lot of help from ham radio stations worldwide.” Torii noted that the RF system on the lander only operates on UHF.

The orbiting module beacon will transmit on 437.31 MHz using PSK31. The surface probe beacon will transmit on 437.41 MHz using FM, PSK31, and PCM-PSK/PM.

[Contact](#) Torii for more information.

I suspect (hope) that every Amateur Radio “big dish” capable of precision aiming will be helping with this mission. The two dimensional aiming necessary to account for Terra and Luna’s respective rotation will be interesting.

Good Interview with Michelle Thompson W5NYV

Eric Guth 4Z1UG does the [QSO Today podcast](#) where he interviews one notable Amateur Radio Operator per episode. It was [W5NYV's turn on 2021-04-02](#) and the interview went 83 minutes, and the transcript went 21 pages. (Kudos to 4Z1UG for routinely doing transcripts!) Much of the discussion centered on W5NYV’s activities regarding Amateur Radio satellites both for [AMSAT-NA](#) and [Open Research Institute](#). What follows are two excerpts that I found interesting and thought-provoking about attracting current and later generations to Amateur Radio. Bold and italics added by me for emphasis.

Eric, 4Z1UG: 1:05:50

Now looking at the pictures of the award banquet, it appeared to me that the majority of the people there were my contemporaries are even older. How do we attract younger people, much younger people into this area of microwave and satellite development?

Michelle: 1:06:08

Well, that is from where I sit, they are attracted. And they're showing up. And they are offering to help and they're contributing. In some cases, in some groups, in some communities, they aren't being seen, because when they show up, they don't look like you would expect. In my own club here in San Diego, for a long time, new people, young people, underrepresented people would show up for one meeting, and never come back. The message that they got was you need to conform to us that you need to enjoy amateur radio the way that we enjoy it. And that was HF, single side- band. And watching videos of the expeditions, and what changed, at least for for our club was just having fun and loosening up on the expectation or the admonitions or the expectations of you know the that you need to enjoy it like, like we do. Another big change that resulted in a much more diverse group of people showing up for these events was to, I wouldn't want to want to say stop or drop but to to accept that, that new people coming into amateur radio today, my son, fourth generation ham, **amateur radio is a part of a lot of other things. It's not a thing that's set off by itself. So it's not a hobby to him.** It's something that shows up in all the other things that he does; the computing leverages amateur radio, you know, his interest in in space or science leverages amateur radio. And once that changed, then then it really changed the number of people that stayed and that kept coming back. So most of the new hams that I meet, and that I see at events and that I talked to and that are volunteers in either ORI or volunteers that show up for AMSAT. The younger ones approach amateur radio in a more interdisciplinary way. And they are coming at it from either computing, software defined radio, microwave band, that's where their entry point is, and running into people that just want to talk about HF single side-band or, why would I want to go to a Maker Faire? The Maker Faire people should come to our meetings, why should we go out there? And why should we go to them, they need to come to us and hearing that as an interdisciplinary person that's not going to gel

well. So that's my point of view. That's what I've seen. **What's been successful is meeting people *where they are* and understanding that the entry point to amateur radio seems to be shifting.** And it's, you know, in my region in my area and what I do for digital signal processing and computing. The entry point is an RTL SDR or Raspberry Pi and GitHub and making your radio do cool things, having a different radio every day. Those are things generally done at microwave.

I think W5NYV's observation here is spot-on. I don't expect a young person that's casually interested in using radio technology to show up at an in-person or even virtual meeting of the local general interest Amateur Radio club. They just don't see themselves reflected in the other attendees or have little interest in the usual subject matter. That's one of the reasons my wife Tina KD7WSF and I were trying to create the Bellingham Makerspace Amateur Radio Group - they will come to the Bellingham Makerspace. If we do a reasonable job, they'll at least get exposed to Amateur Radio where they wouldn't otherwise encounter Amateur Radio. *(Tina and I are no longer associated with Bellingham Makerspace and Bellingham Makerspace Amateur Radio Group.)*

I agree strongly with her observation that for younger folks, Amateur Radio isn't a "hobby"; it's an enabling technology. I'm seeing the same thing with techies who are willing (barely) to get a Technician Amateur Radio license so they can do a few things like be a participant in "Amateur Radio" microwave networks, and use portable radios and repeaters. Thus we're not going to convince such folks to go "full-in" Amateur Radio. Amateur Radio needs to meet them *where they are*... Amateur Radio needs more young licensees, much *much* more than these young techies need Amateur Radio.

Eric, 4Z1UG: 1:16:02

Right, we'll look forward to it. What do you think the greatest challenge facing amateur radio is now?

Michelle: 1:16:07

I think it's time, it's just simply time of a person that wants to get active and this sort of stuff that that I most like cognitive radio, you know, machine learning adaptive radio, radios that that sense, digital, you know, digital broadband modes, multiple user, those sorts of things. In order to really enjoy that, it does take some seat time, you can get in for under \$100, with a simple SDR and some free and free software, open source software. But ramping up to the place where it's really exciting means a fairly significant, you know, amount of time and a learning curve. The biggest challenge to amateur radio, is the lack of accessibility of the software, the lack of ease of use, the hardware is fantastic, we get a new awesome SDR every quarter, at least. And the software's terrible, and people just won't install then it won't build. And what worked last week doesn't work this week, because something was updated. And our our cultural approach to software is not quite there yet. To me, that is the biggest impediment to the enjoyment of advanced digital modes and amateur radio is the software is in general, bad. **It's just it's hard to use, when it when it does work.** Oh, nothing better. It's absolute joy. Getting there, though, you have to sort of have some consensual amnesia. You fight through a problem or walk away, you know, come back later when maybe somebody has fixed it, or you fixed it. And then oh, you know, it's wonderful. It works. You can show it off and you've forgotten about some of those difficulties on

the way. **But but it's the biggest impediment is the lack of time most people have in order to learn and interdisciplinary, sometimes very math heavy part of the hobby**, and the ease of use of almost all the software defined radio software packages and frameworks, they're not easy to use.

She's right - some of the open source software, though incredibly powerful, is really terrible (to use) for those of us who don't live and breathe software development.

I recommend listening to the interview, or reading the full transcript. I learned a few things.

Whatcom County Data Over Repeater Weekly Net

For several years now, the [Digital Group](#) of the Mount Baker Amateur Radio Club (Bellingham, Washington) has operated an informal data "net" on Sunday mornings on 145.580 simplex using the fsq mode of the [fldigi suite](#). Though fldigi and fsq was designed for use on HF, including the narrow channels used on HF, it works well on VHF and UHF, and is especially robust and able to work despite low signal-to-noise ratios, poor audio matching (common with portable radios), etc.

For those first few years, there were small numbers of participants so operating simplex worked reasonably well. There are a handful of us within easy simplex range of each other near Bellingham and Ferndale, Washington in Whatcom County. (Most of us have radios that can transmit at power levels as high as 50 watts on 144-148 MHz.) As numbers increased, and more people that weren't within simplex range of most stations tried to participate, the well-known hidden transmitter / [hidden node effect](#) became a factor. Basically, using simplex, who-can-hear-who is highly variable and in such situations, two stations (who often cannot hear each other) transmit at the same time, effectively (but not intentionally) jamming each other.

Just like mobile and portable voice usage, operating data modes via a repeater fixes much of that issue. Using a repeater, everyone can hear everyone else equally well. In fsq, humans (not the modems) decide when to transmit, and sometimes two humans decide to hit the <enter> key at the same time... but that situation is *much* less common than when using simplex.

The Mount Baker Amateur Radio Club Digital Group is now operating another informal data "net" on a wide-area repeater - [K7SKW on 146.74 on Mount Constitution](#) on Orcas Island (in the San Juan Islands). K7SKW / 146.74 has excellent coverage of Whatcom County, Washington, the San Juan Islands, much of lower British Columbia, and South even as far as Northern King County (Seattle metro area). While the coverage was great, an equal factor in choosing K7SKW / 146.74 is that it's lightly used, and thus there's ample room in the repeater's usage schedule to accommodate this new net on Wednesday evenings.

We started the net on 2021-12-01, and at least for December it's held on Wednesday evenings at 20:00 Pacific. The first four sessions have gone well, with lots of fun chatting, and a bit of experimenting. A few lessons learned:

- Voice announcements about the data net are done at the beginning of the net, at the halfway point (approx. 30 minutes) and at the end of the net.

- There's no interaction between subaudible tones used for [Continuous Tone Coded Squelch System \(CTCSS\)](#) - at least not with CTCSS of 103.5 Hz used for this repeater, and the audio tones used for fsq.
- Adding a minimum of 1.5 seconds of "txdelay" allows the repeater (at least this repeater) to decode the CTCSS tone, bring up the repeater's transmitter, and the modem to begin transmitting well-modulated tones. In Fldigi, go to: Configure > Config dialog > Configure > IDs > RSID > Pre-Signal Tone > 1.5 seconds. This insures that listening stations will receive the full callsign of the transmitting station. (There is a txdelay setting in Fldigi, but it doesn't seem to have an effect.)
- An image transmitted via fsq takes about 3:20 to transmit. (To transmit an image via fsq, the fldigi app downscales the image considerably, no matter what size image you start with.) However, K7SKW / 146.74's timeout timer is currently set to 3:00 at which point the repeater shuts off the transmitter until the input signal drops, then the timeout timer resets. We might adjust the repeater's timeout timer, at least for the data net.
- We try to send out an announcement to the Digital Group's mailing list on Wednesday prior to the net, and a summary after the net so folks know that the net is being conducted and how to join the fun.

Future improvements contemplated:

- Adjust the repeater's timeout timer to allow transmission of full images
- For the voice announcements, state the repeater parameters (- 600 kHz transmit offset, 103.5 subaudible tone).
- A canned script sent at the beginning of the net to remind participants to use allcall so all participants will see the message in their main window of fsq.
- A text file sent at the beginning of the net with some current news.
- Set up a digitized voice message instead of manual voice announcements.
- We need an create an easy to enunciate URL pointing to a web page with instructions on how to join the fun.

As hoped, the Wednesday evening net has attracted folks that weren't available on Sunday mornings, or were outside simplex range of the core group in Whatcom County. The goal for now is to operate the net with consistency so people will know to find us and how to join in the fun.

Amateur Radio Data Communications Orgs and Events

I'll try to maintain a list of organizations and events that specialize in data communications in Amateur Radio. Very generally (and highly subjectively), this listing is intended for organizations and events that one can join and (theoretically) meet up in person. Please let me

know of others.

- [Join TAPR](#) - Supporting TAPR is a “vote with your wallet” for more data communications in Amateur Radio.
- [Amateur Radio Research and Development Corp. - AMRAD](#) - McLean, Virginia
- [ARRL Michigan Section Digital Radio Group](#) - Michigan.
- [Digital Communications Conference](#) - rotates West, Central, East US (generally in September)
- [Hudson Valley Digital Network](#) - Upstate New York (I think - they don't say.)
- [MicroHAMS Digital Conference](#) - Redmond, Washington (generally in March)
- [Mount Baker Amateur Radio Club Digital Group](#) - Bellingham, Washington.
- [Packet Radio User's Group](#) - Tokyo, Japan.
- [Utah Digital Communications Conference](#) - Salt Lake City, Utah.

After this list gets fleshed out, I'll probably only feature it monthly or so.

ZR > BEACON

- [ARISS end of year SSTV](#)
*The ARISS [Amateur Radio on the International Space Station] team will be supporting SSTV [Slow Scan Television] operations from the ISS during the period of Dec 26-31. The images will be related to lunar exploration. The transmissions should be available worldwide on 145.800 MHz. The planned mode is PD 120. Planned start and stop times are currently listed as:
Start - Dec 26 about 18:25 UTC
Stop - Dec 31 about 17:05 UTC*

[AMSAT-UK](#) offers this additional advice:
The signal from the ISS should be receivable outdoors on a handheld with a 1/4 wave whip although tracking the ISS with a small handheld beam will give better results. If your rig has selectable FM filters try the wider filter for 25 kHz channel spacing. You can get predictions for the ISS pass times at <https://www.amsat.org/track/> Useful SSTV info and links <https://amsat-uk.org/beginners/iss-sstv/>
- **Wi-Fi 6E** - If, like me, you have a 2022 chore to “Fix the @#\$\$ Wi-Fi”, here's a minor tip. While Wi-Fi 6 is the newest version of Wi-Fi technology - more streams, wider channels, supports more devices, better range, more reliable, etc., Wi-Fi 6 operates in the *same (crowded) spectrum* - 2.4 GHz / 5.x GHz as previous versions of Wi-Fi.

Wi-Fi 6E can use an [additional 1.2 GHz of spectrum in the 6 GHz band](#). There aren't

many Wi-Fi 6E devices yet, and they're more expensive. Watching the marketing of Wi-Fi 6 and Wi-Fi 6E, I'm observing that some Wi-Fi manufacturers subtly blur the distinction between Wi-Fi 6 and Wi-Fi 6E to encourage buying (more available, less expensive) Wi-Fi 6 devices now, cynically assuming that soon enough you'll buy a new Wi-Fi 6E device when you discover that 80 MHz channels don't work too well in existing crowded spectrum. Also, there are very few client devices that can use the 6 GHz spectrum of Wi-Fi, but there will be - pocket computers, tablets, security cameras, smart speakers, televisions, streaming devices, etc. It's just a matter of time that Wi-Fi 6E support is ubiquitous, and if you're going to update your Wi-Fi, you might as well have the infrastructure waiting for all those newer devices. Wi-Fi 6E client devices connecting to Wi-Fi 6E infrastructure will work amazingly well.

- The new Fall / Winter 2021 **Ham Radio Outlet** [catalog](#) arrived. (Paper catalog? Yeah, I know. What can I say - I grew up with paper catalogs.) I always hope that there will be something surprising in data communications in the HRO catalog, but this issue is the same ole same ole. The only new "Zero Retries Interesting" item of note in this edition was the *NEW* Yaesu FTM-6000R 144-148 / 440-450 MHz transceiver on Page 20. As previously discussed in Zero Retries 0017, the FTM-6000R is apparently a capable data radio. I'm also a fan of the (not new) SDRplay series of Software Defined Receivers on Page 27.
- Proceedings papers from the **2021 40th annual TAPR Digital Communications Conference** are [now available online](#). There are several interesting papers, notably a [new project from Phil Karn KA9Q](#).
- **How to Build a Low-tech Internet** Although *Amateur Radio* Microwave Networking isn't discussed in [this article](#), it's a good overview of small scale, hands-on, do-it-with-some-friends microwave networking. Low-Tech Magazine is an interesting publication - I'm glad they're out there thinking these thoughts, including making their publications available in print if we lose all connectivity (or even power for all our wonderful electronic devices).
- **[ARRL 2021 Technical Awards \(2021-09-09\)](#)**

The ARRL Doug DeMaw, W1FB Technical Excellence Award went to Steve Franke, K9AN; Bill Somerville, G4WJS, and Joe Taylor, K1JT for their July/August 2020 QEX article, "The FT4 and FT8 Communications Protocols." The DeMaw award honors the author of an article or article series judged to possess the highest degree of technical merit in ARRL periodicals for the past year.

...

The 2021 ARRL Technical Service Award recipient is James Baxter, KØUA, of Branson, Missouri. The Board said Baxter "exemplifies the spirit of this award due to his diligent work assisting hundreds of hams get on the air, particularly with FT8, and by spending countless hours on web sessions with them to work out their configuration issues, show them best practices, and to help track down RFI issues."

The Board bestowed the 2021 ARRL Technical Innovation Award on Steve Haynal, KF7O; Wojciech Kaczmariski, SP5WWP, and Roger Clark, VK3KYY. Haynal was cited as the instrumental and driving force behind the Hermes Lite 5 W HF SDR transceiver as a fully open-source hardware and software project. Kaczmariski was recognized for developing the open-source digital radio communication protocol M17, leading to the

development of DroidStar (an Android application) by Doug McLain, AD8DP. Clark was cited for spearheading a successful effort to augment a low-cost handheld radio for use by visually impaired operators, significantly lowering the cost of entry for such amateurs.

...

These were mentioned in the November 2021 issue of QST, page 69.

Feedback Loop

- **Paul Tagliamonte K3XEC** on Zero Retries 0024:

My sincerest thanks for the kind words and mention! I'm loving the newsletter! Thank you for posting so much awesome content on such a regular schedule!

Paul - Compared to your two years of intensive effort to educate yourself on SDR and then then your impressive achievement of explaining it for us average techies... I'm a dabbler. Please keep us apprised of any additional work you release!

Contributors This Issue

- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything*, Bill Vodall W7NWP as *Zero Retries Instigator in Chief*, and Larry Gadallah NM7A for his long term encouragement about Zero Retries.
 - My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#), [Jeff Davis KE9V](#), and [Steve Lampereur KB9MWR](#) for continuing to spot, and write about “Zero Retries Interesting” type items, on their respective blogs, from Amateur Radio and beyond, that I don’t spot on my own.
 - For those that get the reference, [Southgate Amateur Radio News](#) is, to me, the “[Slashdot](#)” of Amateur Radio, and I follow them both on Twitter and their RSS feed. They consistently surface “Zero Retries Interesting” stories.
 - Steve Monsey N0FPF tipped me off about Japan’s OMOTENASHI Luna probe. Thanks Steve!
-

Join the *Fun* on Amateur Radio

If you’re not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, here are some pointers:

- **Ham Radio for Dummies** by Ward Silver N0AX is now in its [4th edition](#). N0AX is a gifted writer, and HRFD is a great overview of Amateur Radio.
- My favorite YouTube channel for a good overview of Amateur Radio, the one I recommend is **AmateurLogic.TV**. [These folks](#) just seem to have so much fun!

- Dan Romanchik KB6NU offers a free **No-Nonsense Study Guide** for the [Technician test](#) (PDF).
- [HamExam.org Amateur Radio Practice Exams](#) offers good **Flash Card and Practice Exams**.
- When you're ready to take an **Amateur Radio examination** (Tech, General, or Extra), W1MX - The MIT Amateur Radio Society offers [remote exams](#), free for students and youngsters. *There are apparently many other remote exam options.*

And, *bonus* - with an Amateur Radio license, you'll be [more attractive on dates](#) 😊

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More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at*

N8GNJ Labs - Bellingham, Washington, USA

Thanks for reading!
Steve Stroh N8GNJ
Bellingham, Washington, USA
2021-12-24

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Below is a much more complete “footer” that has evolved over 30+ issues of ZR.

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- [Radio Amateur Training Planning and Activities Committee \(RATPAC\)](#) offers weekly presentations on general Amateur Radio topics (Wednesdays) and emergency communications in Amateur Radio (Thursdays).
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Closing the Channel

- In its mission to grow Amateur Radio and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything* and Bill Vodall W7NWP as *Zero Retries Instigator in Chief*.
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Thanks for reading!

Steve Stroh N8GNJ (He / Him)

These bits were handcrafted in beautiful Bellingham, Washington, USA

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